

A note on hierarchies and bureaucracies

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Abstract

In this note, we argue that there is a bug in [Tirole, J., “Hierarchies and bureaucracies: On the role of collusion in organizations,” *Journal of Law, Economics and Organization*, vol.2, 181-214, 1986].

Key words: Collusion; Incentive theory.

In this note, the notation is referred to Ref. [1]. Vertical structures are represented by three-layer hierarchies: principal/supervisor/agent. The *principal*, who is the owner of the vertical structure or the buyer of the good produced by the agent, or more generally, the person who is affected by the agent’s activity, lacks either the time or the knowledge required to supervise the agent. The *supervisor* is a party that exerts no effort, receives a wage from the principal and collects information to help the principal control the agent. The *agent* is the productive unit. The profit x created by the agent’s activity depends on a productivity parameter θ and on the effort $e > 0$ he exerts:

$$x = \theta + e.$$

The agent’s effort e is assumed not observable by the supervisor and the principal. The agent’s disutility of effort is equal, in monetary terms, to $g(e)$.

For a given θ , the supervisor’s signal s can take two values: $\{\theta, \emptyset\}$, where \emptyset denotes observation “nothing”. The report r of supervisor is *verifiable*, i.e., if $s = \theta$ then $r \in \{\theta, \emptyset\}$, otherwise $r = \emptyset$. The productivity θ can take two values: $\underline{\theta}$ and $\bar{\theta}$ such that $0 < \underline{\theta} < \bar{\theta}$. There are four states of *nature*, indexed by i . State of nature i has probability p_i ($\sum_{i=1}^4 p_i = 1$). The agent always observes θ before choosing his effort. The supervisor may or may not observe θ . In the

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following description of the four states of nature, S and A stand for supervisor and agent:

State 1: A and S observe $\underline{\theta}$.

State 2: A observes $\underline{\theta}$, S observes “nothing”.

State 3: A observes $\bar{\theta}$, S observes “nothing”.

State 4: A and S observe $\bar{\theta}$.

Claim 1: The supervisor and principal cannot discriminate *State 2* and 3.

Proof: The only difference between *State 2* and 3 is that agent A observes different values of productivity. However, this parameter is agent’s private information and not observable to the supervisor and principal. Put in other words, *State 2* and 3 are indifferent to the supervisor and the principal. \square

Timing.

- 1) The principal offers a contract.
- 2) A learns the productivity θ , S learns the signal s .
- 3) A chooses the effort e .
- 4) Profit $x = \theta + e$, S reports r .
- 5) The principal transfers $S(x, r)$ and $W(x, r)$ to the supervisor and agent respectively.

Claim 2: There is a bug in the agent’s incentive compatibility constraint (*AIC*): $W_3 - g(e_3) \geq W_2 - g(e_2 - \Delta\theta)$ (Page 191, Line 8, [1]).

Proof: As specified in the timing, the wage $W(x, r)$ of agent is transferred by the principal. It only depends on the commonly observable variables x and r , not on the agent’s private productivity θ . Since the principal cannot discriminate *State 2* and 3, the items W_2 and W_3 are indeed meaningless.

That’s the bug, not only for the condition (*AIC*), but also for the whole paper of Tirole (1986).

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References

- [1] Jean Tirole. 1986. Hierarchies and bureaucracies: on the role of collusion in organizations, *Journal of Law, Economics and Organizations* 181–214.